Proposed Agenda for the December 7, 2000, Meeting with NYSDEC Regarding the Onondaga Lake BERA

I. Selection of CoCs (FWIA Step I and ERAGs Steps 1 and 2)

Honeywell will present information on the following subjects:

- Maximum CoC concentrations vs. minimum screening values
- Food-web screening calculations
- Final list of CoCs
- Ecological receptors
- Assessment and measurement endpoints.

Tables of hazard quotients will be provided to NYSDEC prior to the meeting.

II. Issues Related to Site Definition

A. Onondaga Lake Site

Honeywell proposes that the Onondaga Lake site include the lake shoreline, the mouths of all tributaries, the lake outlet, and the following wetlands: – needs to include all wetlands, not just DEC wetlands

- SYW-6 along the northwestern shoreline of the Lake
- SYW-10 at the mouth of Ninemile Creek

- SYW-12 at the mouth of Ley Creek
- SYW-19 at the mouths of Harbor Brook and the East Flume
- Uplands associated with dredge spoils located south of SYW-6.

B. Other Honeywell-Related Sites

Several additional Honeywell-related areas near Onondaga Lake are being investigated in conjunction with NYSDEC, including:

- Willis Avenue Chlorobenzene Site
- Semet Residue Ponds
- LCP Bridge Street Site
- Geddes Brook and Ninemile Creek
- Waste Beds 1–15
- East Flume.
- Wastebed B / Harbor Brook

The major components of each of the investigations described above will be summarized in the revised lake BERA, including:

- Site location and description
- Site history
- Media sampled
- Results (including maximum detected concentrations of CoCs)

- Conclusions (including summaries of ecological evaluations and the potential for offsite migration of CoCs).

C. Seneca River

Honeywell proposes that ecologically related conditions in the Seneca River will be discussed in the revised BERA and potential ecological risks related to CoCs from the Lake will be evaluated qualitatively. Limited data available to do quantitative risk assessment.

III. Issues Related to Water

A. Appropriate Hardness Values

For the screening evaluations, Honeywell proposes to use the minimum hardness value found in the lake or in each tributary to evaluate risks for those metals having water quality values that depend on hardness. For the definitive risk assessment, it is proposed that sample-specific hardness values be used to evaluate risks for each metal.

B. Chronic vs. Acute Criteria

For the screening evaluations, Honeywell proposes to use chronic water quality criteria to evaluate risks for all water samples. For the definitive risk assessment, it is proposed that acute criteria also be used to evaluate risks for tributary samples collected under high-flow conditions. Results based on chronic and acute criteria for the high-flow samples will be compared and discussed.

IV. Issues Related to Sediments

A. Data Quality

Honeywell proposes that the sediment toxicity and benthic macroinvertebrate data collected in 1992 are acceptable for use in the draft BERA, subject to the QA/QC evaluations presented in the draft BERA.

Honeywell also proposes that the data collected for the top 2 cm of sediment in 1992, supplemented by the data collected for the top 15 cm in 2000, are useful for risk assessment. Honeywell will present 2 data sets, separately.

B. Data Analysis Methods

To analyze the sediment toxicity and benthic data collected in 1992 and 2000, Honeywell proposes to use the same data analysis methods presented in the draft BERA, but also supplement them with the benthic metric analyses recommended by NYSDEC. Results of the different analytical techniques will be compared and discussed. In addition, maps of all results will be presented.

C. Site-Specific Sediment Quality Values

we don't want 2 sets of AETs

Honeywell proposes to use the apparent effect threshold (AET) approach to develop site-specific sediment quality values (i.e., Onondaga Lake sediment quality values [OLSQVs]) for the 1992 and 2000 sediment toxicity and benthic data. Primary AET values will be developed based on survival results of the toxicity tests and secondary AET values will be developed based on sublethal results of the toxicity tests and results of the benthic macroinvertebrate evaluations. Separate sets of AET values and OLSQVs will be developed for the two sets of data collected in 1992 and 2000, because of differences in

We want to see ERL, ERM TEL, for 92 data sediment sampling depths (i.e., 0–2 cm and 0–15 cm) and differences in exposure durations (i.e., 10 days and >40 days) for the toxicity tests.

D. Stations of Potential Concern

For the screening evaluation, Honeywell proposes to show maps of all stations that exceeded NYSDEC sediment criteria. For the definitive risk assessment, Honeywell proposes to use the site-specific sediment quality values to identify stations of potential concern (SPCs). The SPCs will be identified using the same rules identified in the draft BERA, which generally rely on a weight-of-evidence to identify an SPC. Those rules follow:

? what is this ?

- If an OLSQV is exceeded *and* a biological effect is found, a station will be considered impacted because there is biological confirmation of the chemical prediction
- If an OLSQV is exceeded *but* no biological effect is found, a station will be considered unimpacted because the biological results are contrary to the chemical prediction
- If an OLSQV is exceeded *but* biological effects are not evaluated, a station will be considered impacted to be environmentally conservative
- If no OLSQV is exceeded *but* a biological effect is found, the station will be considered unimpacted due to the chemicals having OLSQVs, and the biological effect will be attributed to factors such as substrate type
- If no OLSQV is exceeded *and* no biological effect is found, a station will be considered unimpacted because there is biological confirmation of the chemical prediction
- If no OLSQV is exceeded *and* biological effects are not evaluated, a station will be considered unimpacted.

Impacted stations will be classified as primary or secondary SPCs based on the kind of OLSQV exceeded. That is, an impacted station will be classified as a primary SPC if a primary OLSQV for any chemical is exceeded at that station, and an impacted station will be considered a secondary SPC if a secondary OLSQV for any chemical is exceeded at that station, but no primary OLSQV is exceeded.

V. Issues Related to Ionic Wastes

A. Format

In the draft BERA, substances of potential concern (SoPCs) related to ionic wastes (e.g., chloride in water, oncolites in sediments) are addressed individually, rather than as a single category (as suggested in NYSDEC General Comment 1 on the draft BERA). This is consistent with EPA guidance documents and Honeywell proposes to maintain this format in the revised BERA.

B. Review of Madsen's Studies

With respect to NYSDEC Specific Comments 31 and 32, Honeywell agrees to discuss Madsen's work in greater detail. The reason Madsen et al. (1998) was not discussed in the draft BERA was because it was published on June 30, 1998 and was not available for review at the time the draft BERA was produced in May 1998. However, the discussion will not focus exclusively on stressors potentially related to ionic wastes, but will address all potential stressors that Madsen et al. (1998) identifies as potentially affecting macrophytes in Onondaga Lake, including:

- Significant changes in water levels
- Scouring of sediments by wave action

- Limited water transparency (i.e., due to the dominance of primary producers by planktonic algae)
- Mechanical damage from floating masses of filamentous algae (which is supported by the availability of soluble nutrients)
- Predation by herbivores (e.g., carp, turtles, waterfowl).

VI. Issues Related to Amphibians and Reptiles

Because of the limited amount of site-specific data on amphibians and reptiles near Onondaga Lake, as well as the limited amount of data in the literature on the toxicity of various chemicals to those organisms, Honeywell proposes to summarize the available site-specific information and pertinent toxicity literature and to qualitatively evaluate potential risks to those organisms. It is likely that a number of potential site-specific stressors will be identified, rather than a single causative factor.

VII. Issues Related to Food-Web Modeling

We want mammal avian specific

A. Ecological Screening Assessment

1. Exposure Assumptions

They need to add fish

   a. Exposure concentration was assumed to be the maximum measured CoC concentration in any media of exposure

   b. Exposure was assumed to occur 100 percent of the time

   c. Bioavailability was assumed to be 100 percent

   d. Exposure was assumed for the most sensitive life stages

   e. Exposure rate was assumed to be the maximum possible

f. In situations where exposure values are unavailable, conservative surrogates were applied.

2. Screening Assumptions

a. CoCs that failed the criteria comparison for any medium were carried into the food-web screening.

b. CoCs not detected in any fish sample were not considered for screening against piscivorous receptors. CoCs not detected in any sediment samples were not considered for screening of benthivorous receptors.

c. Data from the 2000 sampling event are as yet not available and, therefore, were not included in the screening assessment.

d. Some isomeric compounds (trichlorobenzenes, dichlorobenzenes, chlordanes, nonachlors, dichlorophenols, trichlorophenols, p,p′-DDT/ o,p′-DDT), metabolic products (DDT/DDD/DDE, heptachlor and heptachlor epoxide, aldrin and dieldrin) and Aroclors® were added together and the maximum sum of the samples was screened against the NOAEL for the most toxic detected constituent. When a sample contained undetected and detected isomers, one-half of the detection limit was added in the sum.

e. Conservative surrogate NOAELs were applied in some situations

i. The following avian TRVs were used as surrogates: Lindane TRV for hexachlorocyclohexane; 4,4′-DDT TRV for o,p′-DDT and metabolites; benzene TRV for toluene, ethylbenzene, and xylenes; 1,2,4-trichlorobenzene TRV for trichlorobenzenes (summed); 1,4-dichlorobenzene TRV for dichlorobenzene (summed); benzo[a]pyrene TRV for other PAHs; endosulfan TRV for endosulfan sulfate; dieldrin TRV for aldrin and dieldrin (summed)

ii. The following mammalian TRVs were used as surrogates: Lindane TRV for hexachlorocyclohexane; benzo[a]pyrene TRV for other PAHs; benzene TRV for toluene; 4,4′-DDT TRV for p,p′ and o,p′-DDT metabolites (summed); endosulfan TRV for endosulfan sulfate; dieldrin TRV for aldrin and dieldrin (summed).

f. CoCs for which no NOAEL or conservative surrogate was available were not screened.

B. Baseline Ecological Risk Assessment

1. Habitats of assessment and receptor selection

a. The terrestrial ecological resources considered to be at the greatest risk and, therefore, modeled in this section of the BERA are the top predators indigenous to the region of Onondaga Lake

b. Specific habitats for consideration

i. Onondaga Lake, which consists of a lacustrine environment containing both pelagic and littoral habitat

ii. Littoral wetlands surrounding Onondaga Lake and designated SYW-6, SYW-10, SYW-12 and SYW-19

iii. Uplands associated with the dredge spoils located south of SYW-6.

2. Routes of exposure

a. The exposure pathways for consideration will involve those primary routes by which CoCs present in the sediments, water column, and biota of Onondaga Lake could contact ecological receptors.

b. Potential CoC exposure routes

i. Ingestion of prey items

ii. Imbibition of drinking water

iii. Incidental soil or sediment ingestion.

3. Assessment Endpoints, Measurement Endpoints, and Risk Questions

   a. The primary assessment endpoint will be the stability of indigenous wildlife populations

   b. The measurement endpoints will be the magnitude of impact expected to be incurred by the receptor subpopulations exposed to the CoCs from Onondaga Lake

   c. Risk question: What proportion of the population is exposed to a CoC at a rate greater than the prescribed threshold defined by the TRV?

4. Receptors of Concern

   a. **Onondaga Lake (pelagic)**—The receptors proposed to be at greatest risk in this habitat are those that forage within the water column of the open lake. The endpoint will be the stability of the exposed subpopulations of ospreys and double-crested cormorants.

   b. **Onondaga Lake (littoral)**—The receptors at greatest risk in this habitat are those that forage within the inshore of the lake and depend on indigenous aquatic organisms as their primary food source. The terrestrial receptors considered most likely to be at risk are the mink, the belted kingfisher, the mallard, and the great blue heron.

   c. **Onondaga Lake (wetlands)**—The receptors at greatest risk in this habitat are those that forage predominantly within the wetlands surrounding Onondaga Lake. The receptors most likely to be at risk are the mink, mallard, and great blue heron.

d. **Uplands Dredge Spoils**—The receptors at greatest risk in this habitat are those that forage on insects and small mammals indigenous to this region. The receptors considered most likely to be at risk are the short-tailed shrew (native insectivore) and the red-tailed hawk (native top carnivore).

5. Exposure Assessment Models and Assumptions

a. Exposure will be evaluated in a tiered method based on progressively realistic scenarios

i. **Tier 1**—This tier will model exposure of the specific receptors to all retained COCs under the assumption that while the receptor resides in the general vicinity of Onondaga Lake, its entire prey base, drinking water, and incidental sediment ingestion is derived from the habitat for which it is being assessed. Although an unrealistic scenario for many of the receptors under consideration, this level of analysis will provide a basis for later uncertainty analysis.

Needs Time + Area Use Factors of 1 + 95% Later,

ii. **Tier 2**—This tier will model exposure of specific receptors to all retained SOCs assuming that while the receptor resides in the general vicinity of Onondaga Lake, its home range will be centered on the lake. This scenario is tantamount to the assumption that receptors will nest within the specific habitat under assessment. Because none of the habitats under consideration are adequate to support a double-crested cormorant colony, this receptor will be excluded from this level of analysis. All other receptors and habitats will be considered.

iii. **Tier 3**—This tier will model exposure of specific receptors to all retained SOCs using site-specific data on known nesting locations. This level of analysis is intended to reflect the potential risks within the situation that actually exists as reported by NYSDEC's NY Natural Heritage Program (Conrad 2000, pers. comm.). Identified species and their nesting locations follow:

- Belted kingfisher—northwest shore of Onondaga Lake
- Double-crested cormorant—west shore of Oneida Lake
- Great Blue Heron—east shore of Cross Lake
- Mallard—Onondaga Lake
- Osprey—Three-Rivers Conservation Area
- Red-Tail Hawk—northwest shore of Onondaga Lake
- Short-tailed shrew—Onondaga Lake.

6. Ecological Exposure Model

a. Total exposure concentrations will be determined by summing the contributions from all potential sources using site-specific data.

b. Exposure rates will be expressed as a distribution and will be solved for the 90th, 75th, and 50th percentile concentrations using the following model:

$$EEC = \sum_{n=1}^{N} TUF_n \times AUF_n \times \left(IR_p \times [COC]_p + IR_s \times [COC]_s\right)_n$$

where:

EEC = Estimated environmental concentration (mg/kg body weight-day)

TUF = Proportion of time spent in the region of Onondaga Lake (unitless)

AUF = Proportion of time spent at any location in the region of Onondaga

Lake (unitless)

IR_p = Receptor-specific prey intake rate (kg dry weight/kg body weight)

IR_w = Receptor-specific water intake rate (L/kg body weight)

IR_s = Receptor-specific incidental sediment intake rate (kg dry weight/kg body weight)

$[CoC]_p$ = Representative CoC concentration in the receptors' prey (mg/kg dry weight)

$[CoC]_w$ = Representative CoC concentration in the receptors' drinking water (mg/L)

$[CoC]_s$ = Representative CoC concentration in the sediments incidentally ingested (mg/kg dry weight)

7. CoC Concentration Estimates

a. Specific estimates of CoC concentrations in consumed media ($[CoC]_x$) will be determined based on estimates of the likelihood that a receptor would consume a given concentration (L(EXP)). This will be determined as follows:

$$[\mathrm{CoC}]_x = \sum P([\mathrm{CoC}]/L(\mathrm{EXP}))$$

i. **CoCs in Fish**—The likelihood that a receptor would consume a given concentration of a CoC will be based on the proportion of the diet composed of specific sizes of fish. The behavioral assumptions that will be used to represent these likelihoods are listed in Table 1.

ii. **CoCs in Sediment/Soil**—For the incidental ingestion of sediment or soil, the likelihood that a receptor would consume a given concentration of a CoC will be based on the range of concentrations measured in the lake and directly correlated with the distribution of the CoC within prey.

iii. **CoCs in Surface Water**—No selection assumption will be applied for drinking water such that exposure to any particular measured concentration of a CoC will be considered random.

iv. **Modeled CoC Concentrations in Unmeasured Media**—Modeled media concentrations in an exposure medium ($[CoC]_a$) based on the measured concentration in a source medium ($[CoC]_b$) will be determined through the application of a transfer factors ($TF_{b \rightarrow a}$) as follows:

$$[CoC]_a = [CoC]_b \times TF_{b \rightarrow a}$$

This will only be done when measured concentrations in the exposure medium are not available. Where possible, the transfer factors applied will be media, CoC and concentration-specific factors.

b. **Receptor life history parameters**—Life history information will be determined from the most appropriate literature resources. Proposed values and sources are listed in Table 2. Specifics for their derivation are as follows:

i. **Body Weights**—Body weights were selected from available literature values. They were selected as the most representative estimates of the median body weights for populations native to the northeastern United States.

ii. **Intake Rates**—Food ingestion rates for all receptors, except the great blue heron, were determined based on the allometric scaling equations of Nagy (1987). The food ingestion rate for the great blue heron was determined using a wading bird-specific scaling relation developed by Kushlan (1978). Water intake rates were determined using the allometric scaling equations of Calder and Braun (1983). No incidental sediment ingestion was inferred for the receptors that forage in the pelagic portions of the lake. For the inshore and upland receptors, incidental soil or sediment ingestion was determined based on the findings of Beyer et al. (1994).

iii. **Temporal Use**—For migratory species, temporal use is the number of days an individual would be expected to be in the vicinity of Onondaga Lake. Values were determined from available literature sources. In cases where ranges were considered, the period selected will be the one that maximizes the receptor's time in the vicinity of the Lake

iv. **Area Use**—Foraging ranges were determined from the literature. Utilization within the inscribed area will be determined based on bioenergetic advantage which weights the potential habitat closest to the origin to a greater relative extent compared to area closer to the periphery. Potential habitat will be based on available shore length for the great blue heron and open water surface area for the osprey and double-crested cormorant. All other receptors are assumed to have an area-use factor of 1.0.

8. Effects Characterization

a. Effects characterization will be determined by comparison with toxicity reference values (TRVs). A list of proposed values being considered are provided in Table 3.

b. No quantitative uncertainty factors will be used in the risk characterization. Uncertainties associated with the applicability of TRVs will be discussed in the uncertainty section of the BERA

c. Hazard quotients will be reported for the 50th, 75th, and 90th percentiles of the exposed subpopulations as well as the proportion of this subpopulation likely to exceed a hazard quotient of 1.0.

d. Impacts on exposed populations will be estimated using cohort modeling on reproductive and mortality rates.

9. Uncertainty Analysis

a. Quantitative sensitivity analysis of all factors used in the risk models

b. Qualitative uncertainty of the parameter estimations (both determinant and probabilistic)

c. Uncertainty analysis of potential ecological impact

i. Potential effect on population stability

ii. Potential threat of extinction

iii. Temporal extrapolation on magnitude of impacts.

References

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